Tree Fruit IPM Advisory

Weekly Orchard Pest Update, Utah State University Extension, **April 9, 2008**

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News/What to Watch For:

Pear psylla adults flying; whitened terminal shoots of apple indicating overwintering powdery mildew; identify San Jose scale-infested branches for later monitoring
Prune out fire blight in apple, pear; prune out shothole cankers in peach, nectarine
"Effect of Water pH on the Stability of Pesticides" page 3
Images of bud stages, page 5
Spray information, pages 6-7

Bud Stages

Development of buds on trees in northern Utah continues at a slow pace, not much different from last week. See last page for pictures.

Davis, Box Elder, Salt Lake, and Weber Counties:
Apples: Silver tip - Green tip
Apricots: White bud
Cherries: Swollen bud
Peaches: Swollen bud - 1/4" green
Pears: Swollen bud

Cache County:
Apples: Dormant
Cherries: Dormant
Peaches: Dormant
Pears: Dormant

Grand County:
Apples: Tight cluster
Apricot: Full bloom
Cherries: Swollen bud
Peaches: Pink
Pears: Green cluster

Utah County:
Apples: Dormant - Silver tip
Cherries: Swollen bud
Peaches: Swollen bud
Pears: Swollen bud

Insect and Disease Activity/Info

Specific spray information found on last two pages.

There is still time for northern Utah locations to apply dormant oil sprays on all varieties, including apricots (before first bloom).

Codling moth traps should be up for growers in Grand County.

San Jose scale (SJS):

SJS is a mostly immobile insect that feeds by sucking nutrients from limbs, leaves, and fruit. It is most commonly found on apple, but can also occur on pear, plum, apricot, and sweet cherry.

Heavy infestations can cause an overall decline in tree health and small, deformed fruit. It overwinters as an immature on trunks and scaffolds, and is most often found in the earliest life stage, called first nymphal instar. These nymphs can tolerate temperatures to -10°F. When the sap begins to flow in spring, the overwintering nymphs become active and start feeding again until maturity. After mating, females can lay up to 500 eggs. Eggs start hatching approximately 4-6 weeks after bloom, or 30 days after male flight. There is a pheromone trap to monitor for male flight, but sometimes trap catch can be sporadic. In this case, some growers use first codling moth flight as an indicator of first San Jose scale male flight.

Treatment: An application of 2% oil at tight cluster, either alone or mixed with the insect growth regulator Esteem, can provide good suppression.

Degree Day Accumulations and Insect Development

Upcoming Monitoring/Insect Activity

By Insect (in order of appearance)	
Pear psylla (PP)	Adults active 31-99 DD; egg-laying at 40-126 DD (base 41)
Pearleaf blister mite (PBM)	Adults begin feeding at bud swell
San Jose scale (SJS)	Overwintering nymphs begin feeding when sap flows
Rosy apple aphid (RAA)	First egg hatch around 90 DD (base 50)
Campylomma bug (CB)	Egg hatch begins at first pink (apples)
White apple leafhopper (WALH)	Egg hatch begins at first pink (apples)
European red mite (ERM) (rare)	First egg hatch around 135 DD (base 50)
Codling moth (CM)	Hang traps at 100 degree days (base 50) First flight at 190-260 DD

By Host (see abbrev. at left)	
Apple	RAA, CM, ERM, CB, WALH, SJS
Apricot	SJS
Cherry	SJS
Peach	
Pear	CM, ERM PP, PBM

Degree Day Accumulations

March 1 - Tuesday, April 8

County	Location	Codling Moth, Peach Twig Borer (Base 50)	Western Cherry Fruit Fly (Base 41)
Box Elder	Perry	25	113
Cache	North Logan	8	59
	Providence	8	59
	Smithfield	8	59
Carbon	Price	22	105
Davis	Kaysville	36	150
Grand	Castle Valley	120	290
Salt Lake	SLC	32	115
	West Valley City	35	143
Tooele	Erda	47	149
	Grantsville	50	150
	Tooele	49	149
Utah	Alpine	25	137
	Genola	48	179
	Lincoln Point	---	---
	Orem	46	162
	Payson	55	182
	Provo	50	178
	Santaquin	39	155
	West Mountain	45	167
Weber	Pleasant View	28	122

"Base 41" and "base 50" refer to the lower temperature threshold at which certain insects develop. For example, no codling moth development occurs below 50 degrees.

Production Information

Effect of Water pH on the Stability of Pesticides

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Most pesticides are sold in concentrated form and have to be dissolved or suspended in water before they can be applied to crops. This water can come from various sources, such as wells, ponds, rivers, or municipal water supplies. Water naturally varies in the amount of dissolved minerals, organic matter and pH, depending on its source.

The pH is a measure of the acidity or alkalinity of water, which refers to the number of hydrogen (H^+) and hydroxyl (OH^-) ions in a solution. The scale for measuring pH runs from 0 to 14. The lower the pH, the more acidic is the solution, while a higher pH indicates that the solution is more alkaline. Water at pH 7 is neutral meaning that there are an equal number of hydrogen and hydroxyl ions in the solution. Many areas in Utah have highly alkaline water with high mineral/iron content. In addition, the pH of water from natural sources can vary throughout the season.

The pH of water can negatively affect the stability of some pesticides. Under alkaline conditions, alkaline hydrolysis occurs which degrades the pesticide to non-toxic (inactive) forms. In general, insecticides (particularly organophosphates and carbamates) are more susceptible to alkaline hydrolysis than are fungicides, herbicides, or growth regulators. The end result is less active ingredient applied and poor pesticide performance. The degradation of a pesticide can be measured in terms of its half life. For example, if a product has a half life of 1 hour, the amount of active ingredient is reduced to 50% in 1 hour, to 25% in the next hour, to 12.5% in the next hour, etc. Eventually, the pesticide becomes virtually ineffective. The effect of pH on pesticides varies from product to product and is also moderated by buffering solutions contained in the pesticide formulation. Tank-mixing multiple pesticides can modify the pH of the tank-mix.

The table on the next page shows the half life of a number of insecticide and fungicide products as well as the optimum pH (where known). As you can see from the table, most pesticides are most stable when the spray solution at a pH of about 5. As many water sources are more alkaline than this it may be necessary to adjust the pH of the spray solution. Do not attempt to acidify solutions containing copper-based fungicides, since copper becomes more soluble at a lower pH and may become phytotoxic to crops. In addition, phosphorous acid and other acid-based fungicides should not be acidified since they already have a low pH and lowering it could cause phytotoxicity. On the other hand, acidifying carbonate salt fungicides, such as Armicarb, may render them ineffective.

Check the pH of the water used for spraying pesticides frequently throughout the season. If you know that your water has a pH of 7.5 or greater, consider lowering the pH, especially if you are applying a pesticide that is sensitive to high pH. The fastest way to determine the pH level of water is to test it with a pH meter or test paper. Paper test strips are the least expensive; however, they can be unreliable and can vary by as much as 2 pH points. A pH meter will provide the most reliable and consistent readings. Meters are available commercially for $50 to $400.

Adjust the water pH by using a commercially available acidifying/buffering agent before adding the pesticide. Buffering agents, such as Buffercide, Buffer-X, Unifilm B, and LI 700 Acidiphactant, will stabilize a spray solution at a predetermined pH and keep it at that level. Read and closely follow the directions on the label of the buffering agent and make sure that the solution is stirred well before taking a pH measurement. While a pH of 5 may be optimal, a pH of 6 is usually satisfactory for many pesticides, especially if they will be sprayed out immediately after mixing.

Some buffering agents such as pHase5 or PHT Indicate 5 will have a color indicator when the correct pH is achieved. Growers can add this product into the water until it reaches the color that indicates a given pH. For example, 5 = pink or red; 6 = orange; etc. Granulated food grade citric acid may be the most convenient and inexpensive acidifying material and is available in 50-pound bags from suppliers that handle food grade chemicals. Two ounces per 100 gallons has been shown to reduce the pH of tap water from 8.3 to 5.4.

When tank mixing multiple pesticides and/or foliar fertilizers, check the pH after the products have been thoroughly mixed and adjust the pH as needed. Not all pesticides react the same to the pH of the spray water solution and some products should not be used with buffering agents. Always read pesticide labels for any precautions with respect to pH and potential product incompatibility issues. Apply pesticides soon after mixing and avoid leaving pesticide tank mixes in the spray tank overnight.

Effect of pH on Pesticides, continued from previous page

Optimal pH (where known) and degradation time of selected pesticides

Product	Active ingredient	Optimum pH	Half Life / Time until 50% Hydrolysis*
Insecticides/Miticides			
Admire	Imidacloprid	7.5	Greater than 31 days at pH 5 - 9
Agri-Mek	Avermectin		Stable at pH 5 - 9
Ambush	Permethrin	7	Stable at pH 6 - 8
Apollo	clofentezine		pH 7 = 34 hrs; pH 9.2 = 4.8 hrs
Assail	acetamiprid	5 - 6	Unstable at pH below 4 and above 7
Avaunt	indoxacarb		Stable for 3 days at pH 5 – 10
Carzol	formetanate hydrochloride	5	Not stable in alkaline water; use within 4 hrs of mixing.
Cygon/Lagon	dimethoate	5	pH 4 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min
Cymbush	cypermethrin		pH 9 = 39 hours
Diazinon	phosphorothioate	7	pH 5 = 2 wks; pH 7 = 10 wks; pH 8 = 3 wks; pH 9 = 29 days
Dipel/Foray	b. thuringiensis	6	Unstable at pH above 8
Dylox	trichlorfon		pH 6 = 3.7 days; pH 7 = 6.5 hrs; pH 8 = 63 min
Endosulfan	endosulfan		70% loss after 7 days at pH 7.3 – 8
Furadan	carbofuran		pH 6 = 8 days; pH 9 = 78 hrs
Guthion	azinphos-methyl		pH 5 = 17 days; pH 7 = 10 days; pH 9 = 12 hrs
Imidan	phosmet	5	pH 5 = 7 days; pH 7 < 12 hrs; pH 8 = 4 hrs
Kelthane	dicofol	5.5	pH 5 = 20 days; pH 7 = 5 days; pH 9 = 1hr
Lannate	methomyl		Stable at pH below 7
Lorsban	chlorpyrifos		pH 5 = 63 days; pH 7 = 35 days; pH 8 = 1.5 days
Malathion	dimethyl dithiophosphate	5	pH 6 = 8 days; pH 7 = 3 days; pH 8 = 19 hrs; pH 9 = 5 hrs
Matador	lambda-cyhalothrin	6.5	Stable at pH 5 - 9
Mavrik	tau-fluvalinate		pH 6 = 30 days; pH 9 = 1 - 2 days
Mitac	amitraz	5	pH 5 = 35 hrs; pH 7 = 15 hrs; pH 9 = 1.5 hrs
Omite	propargite		Effectiveness reduced at pH above 7
Orthene	acephate		pH 5 = 55 days; pH 7 = 17 days; pH 9 = 3 days
Pounce	permethrin	6	pH 5.7 to 7.7 is optimal
Pyramite	pyridaben		Stable at pH 4 – 9
Sevin XLR	carbaryl	7	pH 6 = 100 days; pH 7 = 24 days; pH 8 = 2.5 days; pH 9 = 1 day
SpinTor	spinosad	6	Stable at pH 5 – 7; pH 9 = 200 days
Thiodan	endosulfan	6.5	70% loss after 7 days at pH 7.3 to 8
Zolone	phosalone	6	Stable at pH 5 – 7; pH 9 = 9 days
Fungicides			
Aliette	fosetyl-al	6	Stable at pH 4.0 to 8.0
Benlate	benomyl		pH 5 = 80 hrs; pH 6 = 7 hrs; pH 7 = 1 hr; pH 9 = 45 min
Bravo	chlorothalonil	7	Stable over a wide range of pH values
Captan	captan	5	pH 5 = 32 hrs; pH 7 = 8 hrs; pH 8 = 10 min
Dithane	mancozeb	6	pH 5 = 20 days; pH 7 = 17 hrs; pH 9 = 34 hrs
Nova	myclobutanil		Not affected by pH
Ridomil	mefenoxam		pH 5 – 9 = more than 4 weeks
Rovral	iprodione		Chemical breakdown could take place at high pH
Orbit	propiconazole		Stable at pH 5 – 9

*The half-life is the period of time it takes for one half of the amount of pesticide in the water to degrade. Other factors than the pH can affect the rate of hydrolysis, incl. temperature, solubility, concentration, type of agitation, humidity, and other pesticides and adjuvants in the mixture.

Bud Phenological Stages

Apple

Cherry

Peach

Pear

Apricot

Spray Materials - Commercial Applicators

For dormant and delayed dormant timing

Target Pest	Host	Chemical	Example Brands	Amount per acre	REI	Comments
San Jose scale	pome and stone fruits	hort. oil alone or with: lime sulfur pyriproxyfen methidathion	 Esteem Supracide	6-12 gallons	varies 12 h 2-14 d	good coverage essential; research has shown good results with Esteem and oil
Aphids	apple, cherry, peach	hort. oil alone or with: chlorpyrifos	Lorsban	6 gal 4 pints	varies 4 d	good coverage essential
Pear psylla	pear	hort. oil with: esfenvalerate lime sulfur kaolin clay permethrin lamda-cyhalothrin	Asana Surround Ambush, Pounce Warrior	4-6 gallons 3 qts 1 pint 11 gal see label 2.5-5 oz	varies 12 h 4 hr 12 hr 1 day	good coverage essential Surround (organic) must be applied up to 3 times before first bloom.
Pearleaf blister mite	pear	hort. oil with: carbaryl	Sevin	4 gal 4 pints	4 h 12 h	
Coryneum blight (shot-hole)	stone fruits	copper sulfate fixed copper chlorothalonil ziram	COCS, Kocide, etc. Bravo, Echo Ziram	varies varies 3-4 pints 6-8 lbs	1 d 1 d 12 h 48 h	copper can be injurious to plant tissues; fixed copper less so. Do not use after green tip stages. Be sure tank is always agitated during sprays.
Fire blight	apple, pear	fixed copper	many	varies	1 d	do not apply copper after green tip stage because fruit russetting may result

Spray Materials - Residential Applicators

Note that these treatments are only recommended if you know you have the particular pest in your trees.

Dormant and delayed-dormant timing

Target Pest	Host	Chemical	Example Brands	Comments
San Jose scale, aphids	pome and stone fruits	hort. oil alone or with: esfenvalerate malathion permethrin	 Ortho bug-b-gone, Ortho Max, etc. Malathion Bug Stop, Spectracide, etc.	
Pear psylla	pear	hort. oil with: esfenvalerate kaolin clay malathion permethrin	 Ortho bug-b-gone, Ortho Max, etc. Surround Malathion Bug Stop, Spectracide, etc.	Best to treat before egg-laying and when adults are detected. Surround (organic) must be applied up to 3 times before first bloom.
Pearleaf blister mite	pear	hort. oil with: carbaryl lime sulfur	 Sevin variety	Only a single application is needed
Coryneum blight (shot-hole)	stone fruits	copper sulfate fixed copper	Basic Copper, Microcop COCS, Kocide, etc.	copper can be injurious to plant tissues; fixed copper less so. Do not use after green tip stages.
Fire blight	apple, pear	fixed copper	many	do not apply copper after green tip stage because fruit russetting may result